Editor's suggestion

fense? The discovery and hidden of ۱۲-day war airstrikes ۱۲ days of fire, from launch to hit

Where was the defense?

Article ۱۴۰۴/۰۹/۲۲

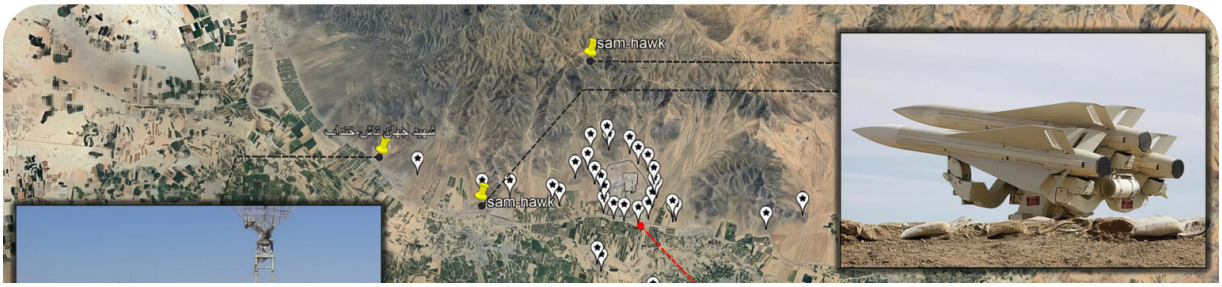
One of the issues raised during the ۱۲-day war is the questionable performance of the country's air defense against Israeli airstrikes; so that in practice, no medium to long-range hunting has been recorded in the record of the forces under the command of Khatam al-Anbia base, and the few recorded hunts have been related to short-range and artillery missile systems; But the question is why?

Part of this can be attributed to the lack of proper equipment and the lack of effective air support. Another part of this situation is caused by surprises in the first day of the war, and another part refers to the continuous suppression of the components of the defense network during the conflict. During the attack, more than ۷۰ personnel of the Army Air Defense Force and the IRGC Aerospace Defense Command were probably martyred (according to the official announcement, ۳۵ of the Army Defense Personnel, and on the same statistical assumption for the IRGC). It should be noted that in some areas, basically, there is no system of air defense, and in some other areas, despite the presence of a strong presence, this defense has not had the necessary effectiveness.

One of the symbolic moments of the war was the attack on the research reactor and the heavy water complex of Khondab, an event that quickly was placed at the center of psychological operations and heavy propaganda and was photographed by Zionist aircraft from different angles. This media focus showed the symbolic and strategic importance of this goal in the narrative of the attacker.

Although the official narrative of the domestic media shows the collision of ۲ projectiles in the series, a review of published images and field evidence shows that at least ۳ projectiles hit the reactor dome and ۳ other projectiles hit the establishment site. This difference between the official narrative and visual evidence has itself become one of the controversial points in assessing the performance of the defense and information management during the attack.

But how was Khondab protected?



Satellite and field images show that the facility was covered by two MIM-۲۳ Hawk/ Mersad firefighting radar, a rocket/Kavosh post-altitude radar, and possibly a well-informed pre-violation radar, along with a large number of artillery rings; Also, in the possible flight profile drawn for the Popai cruise missile, a defense site consisting of a firefighting system of the MIM-۲۳ Hawk was located in the above area. In addition, during the periodic exercises, the deployment of the ۱۵ June defense system was also practiced.

Images show that the projectiles have hit the dome of the Khondab reactor from the west or northwest direction. These projectiles were probably from the type of Poppa Airborne Cruiser (with less probability of a possible cruise) that had a range of at least ۳۰۰ kilometers, and due to the discovery range of about ۱۰۰ kilometers of the Hawk defense system (for the AN/MPQ-۵۰ radar) and a range of ۴۵ to ۵۰ kilometers for the MIM-۲۳ missile, it is possible that the fighter or fighter jets outside the range of the discovery and involvement of the defense ring could have fired their weapons.

Why did the air defenses not downtell missiles with the technology of the ۶۰'s and ۸۰'s?

The Diale cruise missile is not a unique design, hidden missile or technology, and is originally the result of the development of the BQM-۷۴ tactical drone. The BQM-۷۴ Chokar tactical drone has been in the hands of the Israeli Air Force since the ۱۹۸۰s and was used as the target drone to test the performance of defense systems. The drone was then selected as a platform for the development of an offensive weapon, and by making changes to the body design and replacement of the J-۴۰۰-WR turbojet propulsion used in the BQM-۷۴ drone with the turbojet BS-۱۷۵, production of Bitgush Company, the Dhaleh attack cruise missile was developed.

This is also true of the Puppy cruise missile, and it can be seen as the result of the development and addition of a rocket propulsion to the AGM-۶۲ bomb. The AGM-۶۲ Walleye-۲ bomb was provided to the Israeli Air Force in the ۱۹۷۰s and was used in the Yom Kipur War. With the continuation of the use of this weapon by the Zionist regime's air force, the Tadmit air-to-surface missile, which was the result of the addition of rocket propulsion and an improved search for the AGM-۶۲ bomb, was added to the combat organization of this force and was used in the first Lebanon war in the ۱۹۸۰s. The missile continued to form the foundation stone for the development of the Poppa cruise missile.

Accordingly, it can be said that the Deal and Pupa cruise missiles are the result of the development of weapons, which date back to the ۱۹۶۰s to the ۱۹۸۰s.

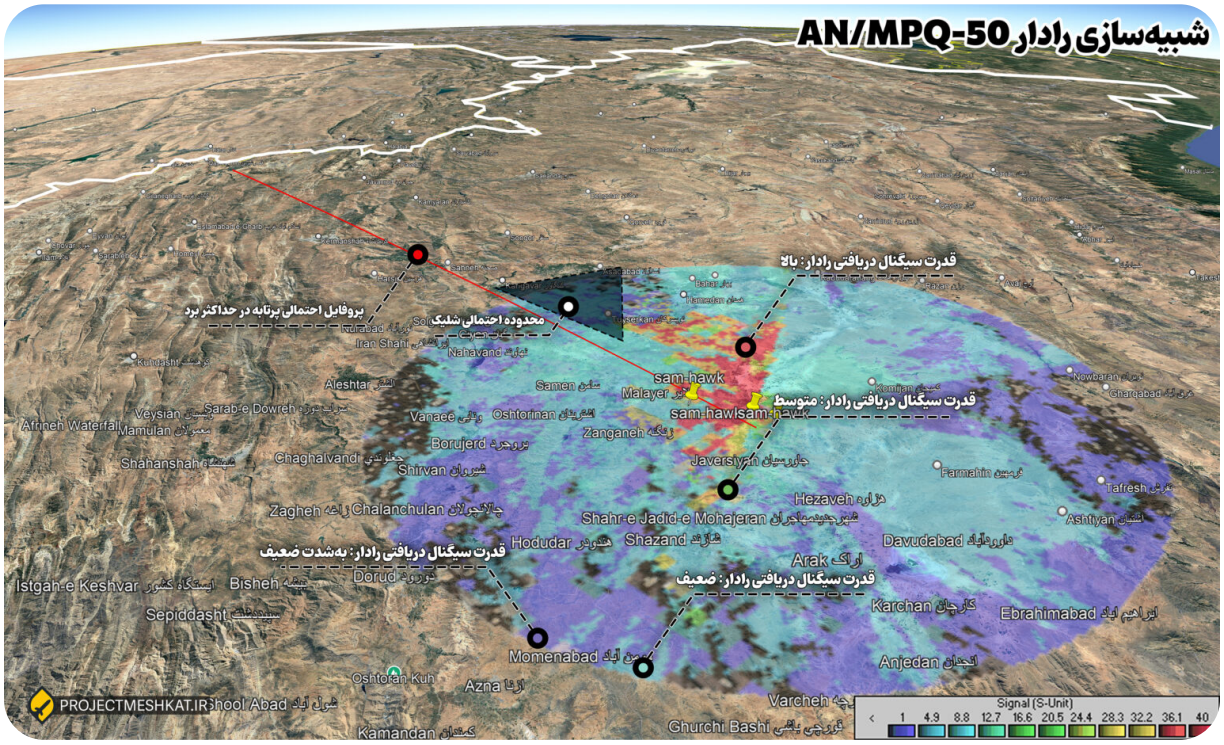
Even assuming the strong suppression of defense in this area, it has been possible to defend against a handful of projectiles fired; while most of the defense equipment in this area is healthy, and other than the destruction of a launcher Hawk and possibly a radar that has led to the testimony of two personnel, no other tangible damage is visible.

Among the dozens of artillery systems around the facility, if an operating electro-optic fire detection, interception and control system was a suitable stabilizer and shrapnel bullets (available at a low cost), effective defense would have been easily provided. At least the Zionist regime had to carry out a few waves of attacks with more advanced weapons.

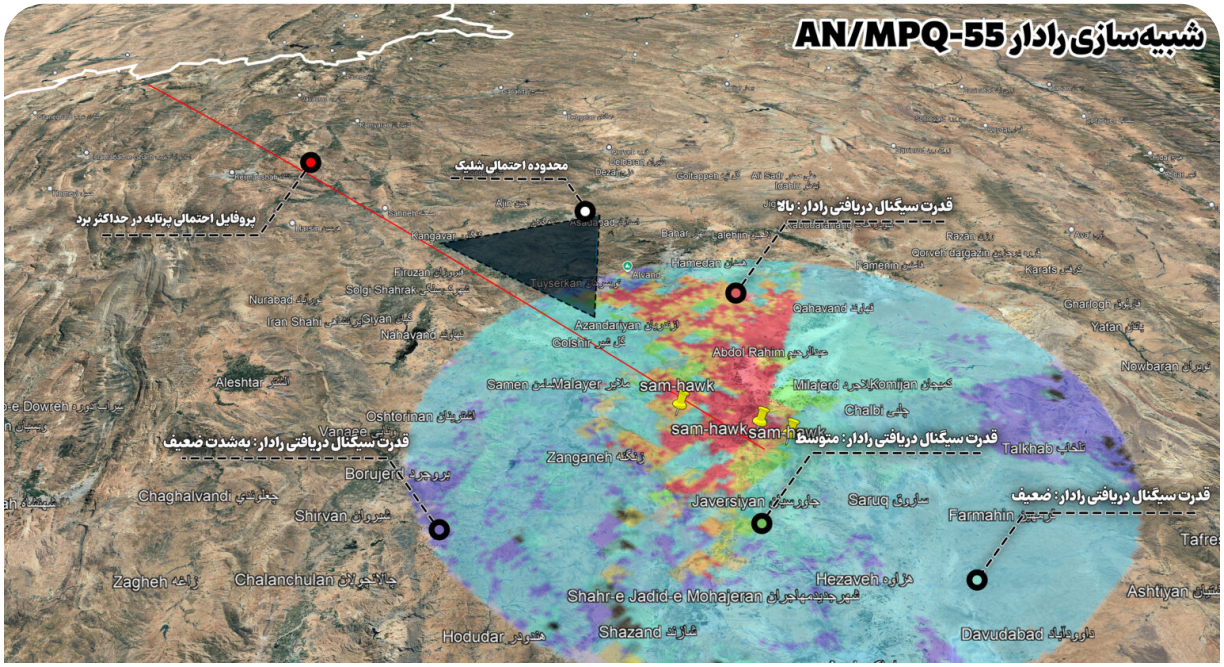
In the examination of radar coverage in the area of Khondab, there are more important points. Based on the available information of the mentioned radar systems, the function of the AN/MPQ-۵۰ radar (high-altitude target discovery radar in Hawke system), AN/MPQ-۵۵ radar (the radar for the discovery of low-altitude targets in the Hawk system) as well as the excavation and informed radars of Al-Fajr can be simulated and evaluated.

The AN/MPQ-۵۰ radar is used as a PAR radar (the Pulse Acquisition Radar) to discover high-altitude and high-altitude targets in the fireplace of the MIM-۲۳ Hawk defense system, from the base version to the third phase of this system. The radar, which is active in the C runway, with a range of about ۱۰۰ kilometers, is able to detect mobile aerial targets and calculate their distance and angle and notify the control

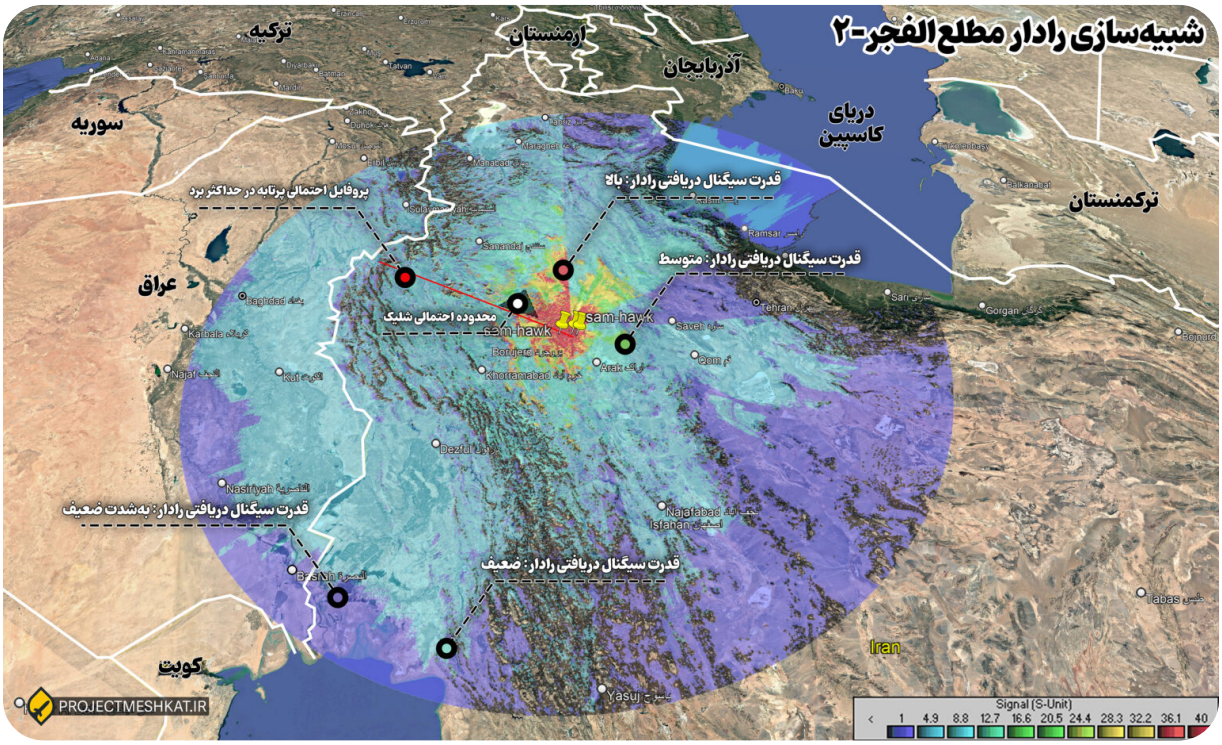
center. This radar has been replaced in the fourth phase of the Hawk system with the AN/MPQ-۶۴ radar.



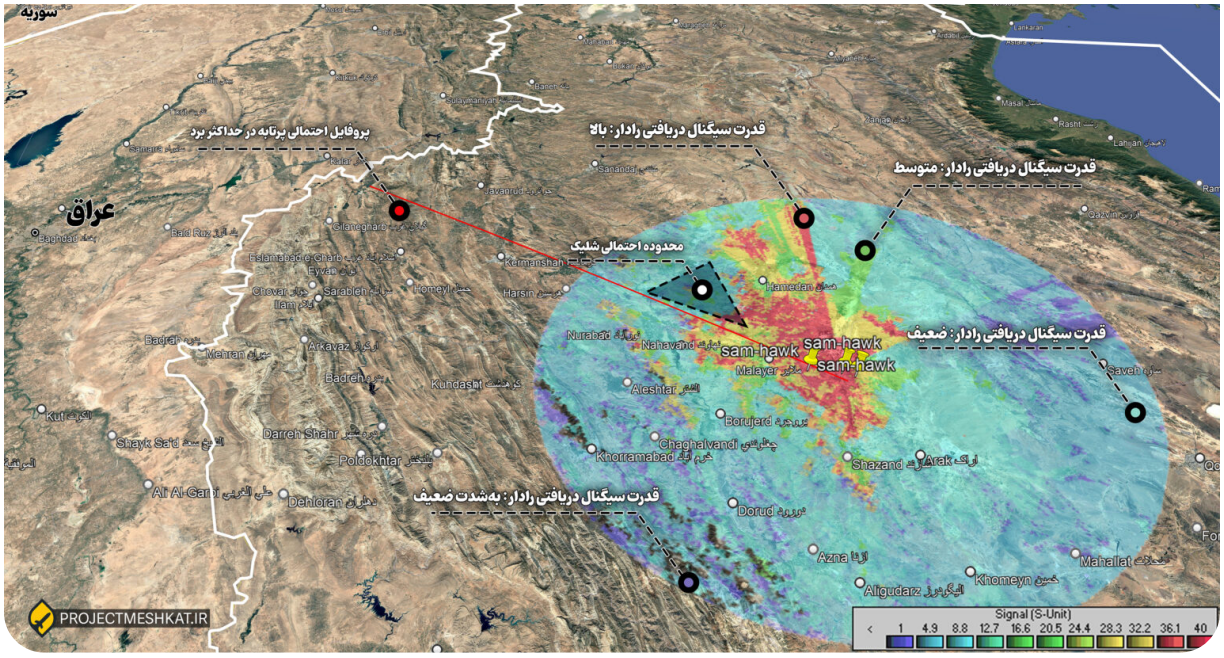
The AN/MPQ-۵۵ radar is used as a CWAR (the continuous wave acquisition Radar) radar to discover targets in the short and low-altitude range in the first and second phases of the defense system. The radar, which operates in the J band, is used with a range of about ۷۰ km and a rotation rate of ۲۰ rpm, to discover hostile targets at low altitudes. This radar, like the AN/MPQ-۵۰, has been replaced in the third and fourth phases with the AN/MPQ-۶۴ radar.



Al-Fajr's informed radar, which is active in the VHF band, has been developed as an internal radar identification and early warning of the P-۱۲ in three versions. Al-Fajr-۱ radar was developed as the first member of this family in ۱۳۸۳. With a specification close to the P-۱۲ radar, the radar had a discovery range of ۳۰۰ kilometers and a height of ۲۵ kilometers of discovery, and as a two-dimensional radar, it was able to explore the side and speed of aerial targets. In the second version, with the increase in the number of antenna elements, boards, accuracy and separation of radar was improved. The radar of Al-Fajr-۲, which was developed in ۱۹۹۰, became a ۳D radar with the ability to detect speed, side and distance of aerial targets with a range and height of the discovery of ۵۰۰ and ۳۲ km. The third version of this family, titled Al-Fajr-۲, was developed in ۱۳۹۳ with the preservation of operational specifications and with improvement in the receiver, transmitter and processor systems and increasing resistance to electronic warfare.



The Kavosh radar, known as the internal example of the Costa-E۲ radar, was unveiled in ۱۳۸۹. The radar is used as a short-range tactical radar in the UHF runway, with a discovery range of ۱۵۰ kilometers and a six-kilometer discovery height, to identify hostile targets at low altitudes, especially cruise missiles and drones.



Based on existing graphs, simulated for a target with an average flight altitude of ۵۰ meters above the ground level (approximately similar to the maximum flight altitude of the BGM-۱۰۹ Tamahak cruise missile), in addition to the phenomenon of the radar shadow, which is seen in these areas due to ground effects, we see a drop in the maximum range of radar detection systems. In the above graphs, the signal return is divided from strong to weak intensity from red to blue.

In this way, it can be stated that although at the maximum range, due to the presence of ground complications and the drop in the signal, the probability of discovering targets (especially low RCS targets) at best was very low and at worst impossible, but at close distances, if the target is discovered by radar systems, it would be possible to act against the fired projectiles and even successfully repel them.

In the meantime, it is necessary to point out that in similar cases, the MIM-۲۳ Hawk defense systems donated to Ukraine, which are like the Iranian version of the Phase-I Hawk version, were able to successfully intercept and destroy various targets, including the drones of the Shahed family of ۱۳۱/۱۳۶, the Kalibar family cruise missiles and the KH-۵۹ family air-promotile missiles!

Before reaching the stage of destruction of hostile goals, there are two important stages of discovery (viewing the target by radar) and interception (calculating the coordinates and determining the direction of the target by the radar), which shows its importance in the successful or unsuccessful destruction of the goals. With the current situation, it seems that the country's air defenses, before reaching the final

stage of destruction, have a serious problem or heavy disruption in the process of discovery and interception, and removing this defect requires special attention to the issue of coordinating ground defense platforms and air-based interceptors.

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